desire for a voiturette, which had better have been satisfied from the first. If he were to sit on one or two committees of the English club above named, he would learn to his astonishment that a number of members who already possess a luxurious car are adding a motor cycle to their "stable," a fact which is hardly in accord with his opinion.

From the brevity of part iii., which deals with electromotors, and of part iv., which devotes to steam cars the short space of four pages, he would appear to be less than kind to the formidable competitors of his favourite petrol explosion engine.

On the whole, the book gives in a very simple and interesting manner a large amount of information which must prove invaluable to the beginner, and may with advantage be studied even by those who are more conversant with the vagaries of the motor car.

The author's style is unusually understandable to English readers, and with a little judicious "skipping" the sense can easily be followed, owing to the number and clearness of the illustrations, without the laborious necessity of using a dictionary.

MERVYN O'GORMAN.

COMPARATIVE ANATOMY OF ANIMALS.

An Introduction to the Study of the Comparative Anatomy of Animals. Vol. ii. By G. C. Bourne, M.A., D.Sc. Pp. xv + 321. (London: G. Bell and Sons, 1902.) Price 4*s.* 6*d.*

DR. BOURNE'S work is divided into thirteen chapters, which, though serial with those of the preceding volume, are separately paged. In addition, there is a short "conclusions" chapter—in reality a concise summary of the contents of the book, with some good advice to the student—and also an excellent index.

The text treats of the cœlomate Metazoa, with a special leaning to the developmental side, which the author regards as indispensable to "a just appreciation of the problems of comparative anatomy." Of the thirteen chapters, the first is restricted to the Platyhelmia, with especial reference to the liver fluke; the second and third to the earthworm alone; the fifth mainly to the mussel; the sixth to the snail; the eighth to the crayfish; the ninth to the cockroach; and the eleventh to the dogfish. The two concluding chapters are devoted respectively to the development of the frog and a very general survey of the field of mammalian morphology; while the three which remain are in turn given to the Annelida, Crustacea, and Cephalochorda in general, to Apus and Amphioxus in particular.

In the selection of material, the author has been guided by the requirements of the "preliminary and intermediate science examinations in the universities of Great Britain." By way of illustration he gives us seventy-seven text figures, many of which are new and meritorious. The researches of Benham, von Boutin, Ehlers, Fraipoint, Hatschek, Kowalevsky, Lacaze-Duthiers, Reichenbach, Vejdovsky, Wilson, and others, have been duly laid to account, with acknowledgment, such as might well have been similarly accorded to certain English workers upon whose labours the author has drawn. Of the author's own diagrams, those illustrating the development of the mammal may be cited as excellent; but even here clearness might well have been further ensured, had the alimentary canal been delineated in outline, as giving rise to the allantois and yolk-sac.

The book is fully up to date and well worthy its predecessor and its author's reputation, and one of its chief attractions is its literary style. Such criticism as we offer must needs be detailed. For example, in defining the urinogenital organs of the mammal, the uterus masculinus is regarded as the persistent lower end of the Müllerian duct, with an accompanying illustration which most nearly recalls the condition in the rabbit. It might have been advantageous to point out that in this animal the organ generally thus named has been proved, by von Kölliker, Pallin, and others, to be a product of fusion of the vesiculæ seminales, and no uterus masculinus at all. Similarly, a little more precision might well have been given to both description and figure of the crayfish nervous system, by directing attention to the approximation of ganglia about the sternal artery, which this genus so instructively exhibits, as a determining feature of the decapod type. With the crayfish, again, the statement that the "gastrolith" "is supposed to form a reserve of calcareous matter to supply material for the new armour formed after ecdysis" is most certainly erroneous, and mention might rather have been made of the evidence for its association with this very function. Nor is the author more fortunate in his treatment of the decapod mandible, the wholly endopoditic nature of the "palp" of which cannot be maintained in knowledge of the facts recorded by Boas. And when we come to questions of doubt, we cannot accept the declaration of the supposed composite nature of the "cerebral ganglion-pair" in Anodon, deduced, as it would seem to be, by analogy from Pelseneer's statements for Nucula.

As to terminology, while the author is at most points sound, we consider him in error in the term "demibranch" as defining the gills of sharks; *hemi*branch it should surely be, since the root noun is Greek. Again, we much prefer the term *thoracic* to dorsal, as applied to the mid-trunk vertebræ of the mammal; and while we consider the description of the mammalian coracoid inadequate, we can only refer to the statement that the corpus callosum is characteristic of the mammalian brain as misleading, since the Eutheria alone possess it as now defined, viz. as a tract of neopallial commissural fibres invading the alveus.

The foregoing amounts almost to hypercriticism, where all else is so well done; and we would rather congratulate the author on the production of a book which, while professedly written up to the requirements of an examination system, is thoroughly trustworthy and eminently readable and instructive. It fully realises our expectations, expressed on reviewing its companion volume (NATURE, vol. lxii. p. 364); and, as an additional recommendation, it may be said that, in order to ensure clearness and continuity, details are in places suppressed, reference being given to authoritative sources whence they may be found already described.

There is an interesting erratum of a page and a quarter which calls for special comment, viz. a corrected figure and description of the synangium of the frog,

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which, as now described, is in line with previous knowledge and most recent investigation. The figure in the first volume which it is to replace, incomprehensible as it stands, is now admitted by the author to have been due to confusion, in the attempt to reconstruct his own rough drawings during the intervals of military duty. If only for this we forgive him, despite his somewhat emphatic contentment with the original, now condemned. An attractive elegance is a leading feature of this book, and by this it is calculated to draw the reader to its subject. In this respect it contrasts both forcibly and favourably with the baldness of expression and lack of culture which characterise many of its would-be competitors.

THE CLASSICS OF PHYSICAL SCIENCE.

Scientific Memoirs. Edited by J. S. Ames, Ph.D. Fifteen volumes, prices varying from .60 to 1.00 dollar each. (New York: American Book Company, 1898 to 1902.)

IT is refreshing to meet with this series. Not that the contents are novel, though recent things are not lacking. It is the aim of the series which is stimulating. Our students are gradually being degraded into a reliance upon text-books for nourishment instead of being brought up on a study of scientific classics. It was not ever thus. Time was when text-books were almost unknown, and knowledge of science had to be acquired by a study of original sources. The more modern craze for, and reliance upon, examinational tests has altered all that. Nowadays a man must know a little bit of every branch of the rapidly extending circle of sciences in order to take a county scholarship or a degree. And text-books spring up by the dozen to supply the very special wants of any newly created examination. It is possible, and it is to be hoped, that the new regulations in the University of London will tend to remedy this state of affairs. Much greater stress is to be laid upon a knowledge of recently published work, and the habit of mind that is so induced is bound to be a healthy one. We wish, too, that for the less recent work men were more encouraged to put text-books on one side and study some one branch at least in the original memoirs.

This handy series in fifteen volumes is a move in the right direction. It consists of translations or reprints (in English) of memoirs dating from the rise of physical science to the present day. Each volume is confined to one subject, has a separate editor, who writes a very short preface—in part historical, in part elucidatory—and also a brief biographical sketch of each of the writers whose memoirs are selected from. The first volume consists of papers by Gay-Lussac, Joule, and Wm. Thomson and Joule on the "Free Expansion of Gases." In the brief introductory sketch it might have been well if the editor had pointed out the essential distinction between the earlier and the later experiments. Thus, while the absence of a fall of temperature in Gay-Lussac's experiments is so far a proof of Mayer's hypothesis, its absence in Joule and Thomson's experiments would not have proved it. In fact, the editor is labouring under a very common mistake in thinking that the experiments all satisfy the condition of zero performance of external work; this is the case in the first but not in the last. It is a pity that the expression "free expansion" is not reserved for cases which satisfy the above condition, and some other term (*e.g.* throttle expansion—the term of the refrigerating engineer) be employed where the conditions are those which obtain in porous plug experiments or the "wire drawing" of steam.

The other volumes are as follows:—

Vol. ii. "Prismatic and Diffraction Spectra." Papers by Fraunhofer and Wollaston.

Vol. iii. "Röntgen Rays." The now historical papers of Röntgen and Stokes (the Wilde Lecture) and J. J. Thomson.

Vol. iv. "The Modern Theory of Solutions." Pfeffer, van 't Hoff, Arrhenius and Raoult.

Vol. v. "The Laws of Gases." Robert Boyle and Amagat.

Vol. vi. "The Second Law of Thermodynamics.' Carnot, Clausius and Thomson.

Vol. vii. "The Fundamental Laws of Electrolytic Conduction." Faraday, Hittorf and Kohlrausch.

Vol. viii. "The Effects of a Magnetic Field on Radiation." Faraday, Kerr and Zeeman.

Is it a fact, as stated by the editor, that in the Hall effect "the stream lines of an electric current flowing through a thin conducting sheet transverse to a magnetic field are deflected"? That the lines of electric force are deflected is, of course, certain; but the two statements are not equivalent.

Vol. ix. ""The Laws of Gravitation." Newton, Bouguer, Cavendish, with abstracts from others.

Vol. x. "The Wave Theory of Light." Huygens, Young and Fresnel.

Vols. xi. and xii. "The Discovery of Induced Electric Currents." Joseph Henry and Faraday.

Vol. xiii. "The Foundations of Stereo-chemistry." Pasteur, van 't Hoff, Le Bel and Wislicenus.

Vol. xiv. "The Expansion of Gases by Heat." Dalton, Gay-Lussac, Regnault and Chappuis.

Vol. xv. "The Laws of Radiation and Absorption." Prévost, Stewart, Kirchhoff, and Kirchhoff and Bunsen.

The editor attributes to Kirchhoff the first rigorous proofs of the celebrated law connecting emission and absorption. This is the common view; but in the light of Rayleigh's recent vindication of Stewart in the *Philosophical Magazine* this attribution is inadmissible.

It will be seen from the above very brief summary what the kind of selection has been. Other editors might very well have selected differently without effecting any improvement.

If a criticism may be attempted, it is that objection may be easily raised to the abridgment which several of the papers have undergone. Much may, of course, be urged in favour of this pruning when carefully done; but the necessity for it is certainly to be regretted. It recalls the similar process which novels have been obliged to submit to—a process which suggested to *Punch* the brilliant idea of republishing pictures with parts deleted The editors carefully point out, however, when they have applied the knife, and they appear to have used it with care.

At the end of each volume is a bibliography, in which reference to allied papers is made.

With this our task is done. This is not the time to discuss the matter of the papers themselves. Let it only

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